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The MUSKRAT

A CANADIAN FUR RESOURCE

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THE

MUSKRAT

A CANADIAN FUR RESOURCE

DEPARTMENT OF THE INTERIOR
CANADA

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FOREWORD

THE increased demand for muskrat pelts, the consequent rise in price of this popular fur, and the marked decrease in the natural supply, are the main reasons for the development of muskrat farming in Canada to a substantial and growing industry. While considerable knowledge relative to the breeding, feeding, and care of muskrats has been gained through contributions made by pioneers in the business, there are still many contradictions in the results noted, which can only be eliminated by patient and intelligent observation and scientific investigation.

To obtain the best results the muskrat farmer must apply particular knowledge and special technique to his ranch practice, much of which can be acquired only through actual experience in handling and studying the animals themselves. The purpose of muskrat farming should be not only to increase production of the animals but to improve the standard of the breed and the quality of the pelts.

Believing that the areas in Canada suitable for production of muskrat can be made to contribute still more to the quantity and quality of this fur-bearer if the principles of conservation and propagation are fully applied, this booklet is issued in the hope that the information therein may be useful in raising the muskrat farming industry to a position of greater economic importance.

THE MUSKRAT AS A CANADIAN FUR RESOURCE

The muskrat ranges over the greater part of North America and is found generally throughout Canada. It is known also as musquash and musk-beaver, and in form and colour resembles the beaver. When full grown it is about four times as large as the ordinary brown rat. The muskrat possesses glands which emit a strong odour of musk, which is especially noticeable in summer. No other animal leads a more aquatic life with the possible exception of the beaver. While mainly nocturnal, it often goes abroad in the daytime, especially if quiet conditions prevail.

In the commerce of furs there is no fur-bearer of more importance than the humble but prolific muskrat. Under the trade name of "Hudson seal," its pelt has become a favourite, filling admirably the great demand of the average citizen for a fur moderate in price and durable in quality. It is used in the making of many articles of fur and is effective whether natural, plucked, blended or dyed. The pelt of the muskrat varies somewhat in texture and colour, due largely to climatic and other conditions of location. It consists of a dense under-fur and projecting beyond this are long glossy overhairs. In general the colour is brownish, darker on the back and lighter on the sides and belly. The term "black muskrat" refers only to its colour and this kind is somewhat rare in the wild state. The pelt of the black muskrat surpasses in lustre and density that of the brown and is consequently rated higher and commands a higher price, especially when used in the natural or undyed state. In durability the pelt of the muskrat is ranked at thirty-seven per cent as compared with the pelt of the otter, which has a ranking of one hundred per cent (100%) in fur durability. The average size of the pelt is about 8 inches by 12 inches.

Grading of the pelts is determined according to origin, colour, size, condition and time of taking; thus the terms fall, winter and spring fur have an importance. The best pelts are those caught in late winter and early spring, due allowance being made for variations in climate according to location. The fall muskrat pelt is light in fur and the late spring ones, though heavy, are not so desirable for the dyeing purposes of the trade.

The skin of the muskrat is used both dyed and in the natural state. Besides the full size skins which are seal-dyed and popularly termed "Hudson seal," the natural skins are cut into strips formed of the backs, sides and bellies. These are modelled and sold in three distinct tones or shades—garments formed of the backs or dark parts of the pelts are called "black muskrat," those formed of the sides or medium shaded parts are called "golden muskrat," while those called "silver muskrat" are formed almost entirely of the belly sections. These strips are worked in vertical, horizontal, and diagonal patterns, or any combination of these, with fine effects.

MUSKRAT AS "HUDSON SEAL"

Muskrat skins form the principal item in the number of fur skins treated yearly in Canada's fur-dressing and fur-dyeing establishments. From an economic standpoint one of the notable achievements of the fur-dyeing and dressing industry in America in recent years has been the development of the muskrat pelt for what is termed "Hudson seal," which is muskrat in the sheared and dyed state. When this industry in America was still undeveloped furs were dressed and dyed mainly in Europe and such a name as Leipzig was a standard of excellence in the processes of dyeing and dressing of furs. To-day the growth of the fur trade in North America and the rapid advancement of the dyeing and dressing business, especially in the United States, have shifted the predominance to this continent and have resulted

in the production of fur goods equal to European standards. The pelts for "Hudson seal" garments were formerly dyed in Paris and Germany but now Canadian and United States dyers turn out a product that is perhaps superior in quality, in life of leather, and workmanship.

In the trade, pelts termed "northerns," which include a considerable portion of the Canadian muskrat catch, are those most suitable for the making of "Hudson seal." Some eighteen operations are said to be required to convert the raw pelt into the finished product and many of these operations are complicated and very scientific. In the making of a muskrat coat as many as two or even three hundred skins may be sorted and matched to obtain the selection of pelts required. An average size coat requires about fifty skins. Some of the articles of wear for which muskrat is used are coats, caps, muffs, mitts, scarfs, motor robes and linings.

So popular a pelt as the muskrat's must needs have imitations. The seal-dyed muskrat, which was an imitation of seal, is now in its turn subject to imitation. These imitations are made mainly from European or Australian rabbit and are called among other names "near-seal" and "sealine." These ingenious methods of the trade but accentuate the firm place the muskrat holds as a popular-priced fur.

VALUE AS FOOD

The muskrat is practically a vegetarian and one of the cleanest of animals. The flesh is fine grained, tender and dark in colour. In flavour it has been likened to terrapin and is said to be very palatable. Proper methods of preparing the meat and cooking it are required to bring out its qualities. It is prepared fried, roasted or stewed. The flesh is sold extensively in many of the cities of the United States. Its consumption as food is not confined to the poorer classes; in many cases a market is found among the well-to-do. Annual muskrat banquets are features of numerous exclusive sporting clubs in the United States.

The incentive to the muskrat trapper is primarily the value of the pelt but the preparation of the meat for the market necessitates so little extra labour that considerable additional monetary advantage may accrue to the muskrat vendor from the sale of the carcasses. They average about 1½ pounds dressed and sell at $2.50 to $3 a dozen wholesale. Various commission houses especially in the Eastern States deal in this product, the greater portion being shipped to Baltimore, Philadelphia, and Wilmington. The wholesale and retail prices fluctuate somewhat with the demand. In the process of skinning, the novice should exercise care in keeping the flesh from coming in contact with the fur. Avoid cutting into the musk glands and be careful to trim away any portion of the glands that may adhere to the meat. Persons who have any skill in skinning have no difficulty in keeping the hair side free from contact with the flesh and in many cases the musk glands come off with the skin. The musky odour pervades the flesh only in summer time. In winter time such odour as may remain can be removed by washing.

INCREASING THE MUSKRAT RESOURCES

It is generally conceded that an increase in the numbers of muskrat is a pressing need and that one means of increasing the supply is by propagation under control. Muskrat farming until recent years was the exception, but it is at present undergoing a marked expansion due chiefly to the demand for the pelt and the depletion of the supply. In Canada, according to official figures for the last recorded year, 1926-27, the catch was less by more than 178,000 pelts than during the previous year and more than 700,000 less than for 1924-25.

In the past most persons engaged in the occupation of what was termed muskrat farming owned or leased marshes where the muskrat were trapped annually with little or no definite plan. The care given the animals was little more

than to trap some of their natural enemies and perhaps to supplement to some extent the natural food in times of emergency. At present, however, as a result of knowledge gained by practical breeders and from investigational work carried on relative to the life history, habits and the actual conditions under which the animal lives, valuable data have been obtained and muskrats are now being bred not only under control in protected marsh lands but confined under semi-natural conditions which permit of close observation. One method found suitable for studying their habits under semi-natural conditions is by fencing off a small plot of marshland about 50 by 100 feet and placing therein a few pairs of muskrat. Here they may be studied and, if desirable, selective breeding may be carried on. An elevated walk, built to extend over the plot, will aid observation. They are also being raised in pens much in the same manner as fox, mink, rabbits, and other of the smaller members of the fur-bearing family. Wild life preserves, where experimental work in connection with the breeding of this and other fur-bearers is possible, have been established by some of the provinces of Canada. The growing importance of the industry as a whole or part-time occupation to farmers and others is being generally recognized.

It has been demonstrated that muskrats can be introduced into localities where they have never been previously, providing physical conditions are to their liking. This has been shown by the introduction of this fur-bearer on Vancouver Island during recent years. Another instance was the placing of them in the Imperial Valley, California, in a region that was once a desert. On the other hand their transfer to localities where they had previously been unknown and where the conditions were apparently unfavourable has resulted in failure. In this connection it is stated that Canadian muskrat were introduced into Bohemia some years ago. They spread rapidly but their progeny did not maintain the silky fur of their ancestors, the fur becoming coarse and unfitted for the fur trade.

IMPORTANT FACTORS

The propagation of any wild animal under restraint usually develops a number of perplexing problems. In connection with the muskrat, however, these problems are stated to be less pronounced than in the cases of some other fur-bearing animals that have been successfully bred in captivity. In its natural state the muskrat has the advantage of being fairly free from disease, which is an important consideration.

When the muskrat is raised in its natural habitat it should have a constant and adequate supply of uncontaminated water, protection against enemies and poachers and a plentiful supply of vegetable foods, grains and fruits. Opportunity should be permitted them to breed undisturbed from March to September. The trapping of them for breeding purposes should be preferably in the fall after breeding and before the house building time when they are strong and in good condition for handling. They should be trapped alive by means of box or other traps or by being lured into enclosures on land. Those reserved for sale as breeding stock should be penned in separate enclosures while awaiting shipment, thus eliminating the danger of injury through fighting. Selections of some of the best specimens should be made and occasionally new high quality breeding stock should be introduced for the purpose of propagating a higher type of muskrat. The habits of the animal and the best ranch practice relative to its propagation, as demonstrated by experience, should be studied by the rancher. He should also keep in touch with the commercial aspects of the business and be able to instruct others, such as buyers of stock, in the essentials. It should be remembered that as in most other occupations success is in a large measure due to the manner in which the operator or breeder applies himself to the care of his animals and the mastering of the details which successful muskrat farming involves.

ADVICE TO BEGINNERS

Too many persons who seek information in regard to fur farming are under the impression that they may engage

in the business with little or no knowledge of the habits of fur-bearing animals, or experience in the raising of them. This lack of experience may also incline them to become too easily receptive of propaganda holding promises of large profits from fur farming with little effort or labour. Inexperienced persons would do well to obtain, if possible, some fur farming experience and thus learn from actual contact with conditions the principles involved. It is unwise to start fur farming, especially the pen-raising method, with a large number of animals. It is better to start with a few pairs and enlarge one's operations as knowledge and experience in ranching practice increase.

MARSHLAND RAISING

The area of marsh land necessary for muskrat farming depends largely upon whether a person intends to take up the business as a whole or a part-time occupation. As a whole-time occupation the business would have to be conducted on a considerable scale but it is also possible to operate a fair size acreage as a part-time occupation. In this way muskrat farming provides an opportunity for agriculturalists and others to transform marshes, sloughs, etc.. useless for other purposes, into profit-making areas.

The best place to begin marshland farming of muskrat is in a marsh already occupied by them. The type of habitat best suited for the raising of muskrat is a combination of ponds and creeks provided with considerable cat-tail flag covered areas. There may be some variation as between the spring and summer levels of the water in these areas and some parts may not be submerged completely throughout, but under normal conditions in cat-tail marshes there is generally a good supply of food. There is also usually suitable protective cover which renders the muskrats reasonably free from disturbance. In this type of habitat muskrat houses are usually found in considerable numbers, the houses being built of various forms of marsh vegetation. Muskrat houses

vary in size and in the number and construction of their interior chambers; the floor of the living chamber is usually above high-water mark. From each house extends a system of tunnels or runways which give access to the feeding grounds. They also burrow in banks, which they are said to prefer, and very often tunnel from the beds of lakes and streams considerable distances to obtain the benefit of high bordering ground. The course of the tunnel is from a point in the bank under the water line upwards to a point two or three feet above the water line. At the end of this tunnel the nest is built. In times of low water these tunnel entrances may be exposed.

ARTIFICIAL AIDS

On any location precautions should be taken to learn whether it goes dry in summer or freezes to the bottom in winter as such occurrences would mean failure. Such unfavourable marsh conditions may, however, be remedied by means of dams or other artificial methods. Ground conditions within or surrounding a marsh should be carefully observed and studied. Where there are no banks it has been found profitable to provide them by ditching and throwing up the earth so as to form banks, but these must be made deep enough to accommodate the animals. Some farmers assist the muskrats by placing nest-boxes for their occupancy in the banks, especially those banks artificially created, with tiles to serve as entrances. Ready-made houses of marsh hay and rafts on which is placed material for house building are other innovations which have been found advantageous. When muskrats can den in banks or be provided with artificial houses, marsh vegetation which would otherwise be required for building houses may be utilized as food. In this way a denser muskrat population may be accommodated.

NUMBER TO THE ACRE

In most marshes inhabited by muskrat there is an uneven distribution of houses. In some marshes a number may be grouped in close proximity to one another. Statements of observers in various localities give the distances between houses as all the way from six houses in an area of twenty by fifty feet to one every fifty or more feet apart. Nests in a house are given as one up to seven and sometimes these have been found on different levels in a house. The number of muskrat which a marsh can support is limited and the danger of overcrowding is one which may have to be met. Where the marsh is enclosed the problem is presented more acutely than where the range is less limited and where the muskrat can migrate under unfavourable conditions of food scarcity or drought. The number of muskrat a given marshland area may be expected to yield is subject to variation, as food and climatic conditions are known to affect the breeding habits of the animal.

Dealing with density of muskrat population in certain marsh areas of Louisiana, Mr. Stanley G. Arthur, in "The Fur Animals of Louisiana," states that his investigations so far lead him to conclude that muskrats are normally present in the greatest numbers wherever the peaty humus is several feet in thickness. This overlay which consists of about 90 per cent vegetable matter is composed largely of accumulated dead remains of the sedge and grasses of the region.

In good marshland there is reason to believe that five pairs of breeding stock to the acre together with their young could be supported. The number trapped would be gauged by the abundance of the food supply. Under favourable conditions in Canada an acre of marsh should support fifty muskrat without extra feeding. Some place the number at a higher figure.

ENEMIES

Among the enemies that prey upon muskrat are mink, fox, weasel, otter, hawks, crows, owls and snapping-turtles.

Some of these, such as mink, weasel and snapping-turtles, are especially destructive. Young muskrats particularly suffer from birds of prey during the spring and fall migration. Horned owls and hawks are dangerous foes of the muskrat. Floods and drought have more or less serious consequences, while cold winters with their ice conditions, especially in northern climtes, affect them, as do marsh fires in dry seasons.

BREEDING HABITS

The study of the breeding habits of muskrats under natural conditions has thrown considerable light on their relations. There is reason to believe that muskrats introduced into a marsh must outfight opposition to establish themselves. New stock should be placed in the marsh in time to give them ample opportunity to become established and to prepare for winter. It is advisable also to place even pairs of breeders in the marsh. In spring the winter colonies break up and the males search for mates which occasions considerable fighting. After mating the pair will go about together until the female begins to build a nest.

POLYGAMOUS OR MONOGAMOUS

While a number of writers have given their opinion that the muskrat is monogamous and that the basis of the colony is the pair, this does not seem to be the case in all localities. In a bulletin, "The Fur Animals of Louisiana," published by the Department of Conservation of Louisiana in 1928, it is stated that "it is quite evident from field experiences that the muskrat is polygamous." The further statement is made that "trappers know well that it is the habit of the boar to travel a great deal, forcing his attention on all females encountered while on his nocturnal love foray," that "the boar seems to be continually on the go except when he is busy fixing up his bachelor quarters" and that "careful investigations indicate that while pairs, a male and female, presumably do work on a single house, at the same time

other observations show that pregnant females will construct a house alone and unaided, and several cases of a solitary male making himself a very large and commodious dwelling-place have been noted."

PERIOD OF GESTATION AND LITTERS

Authorities differ as to the length of the period of gestation and it has been variously estimated at from twenty to thirty days. Climatic conditions which are stated to affect the breeding habits of muskrat may account for this difference in time. The young are born with their eyes closed. The statements made in the past that muskrats are born naked are not borne out by some of the investigations carried on relative to muskrat in Louisiana. As a result of these investigations it is stated that muskrats are born with a fine silky pelage which grows darker and heavier by the time their eyes are open, which is usually in about fifteen days. Young muskrats must be carefully handled. They should not be taken up by the tail but grasped around the shoulders and the back of the head. The young do not make trips from the nest until they are about a month old. At this time the female will again accept service and another litter will be born. Sometime before the arrival of the second litter the young of the first litter will be forced out but they will establish themselves nearby. They are said to pair when about three months old, each pair forming the basis of a new colony. The grouping of the winter family will consist of a pair of adults and those young which have not yet reached breeding age. During the winter period, especially in northern areas, breeding is unlikely and the family will live contentedly together throughout the winter. The statement sometimes made that muskrat breed all the year around in some southern localities is true only in a limited way, and the number is stated on good authority to be small. There is evidence to support the contention that under favourable conditions the young of the first-born spring litter will themselves bear young in the same year. As due

consideration must be given to individual differences, age, and fluctuations in fecundity, three litters a year with an average of five to a litter would probably be a fair basis of computation.

LONGEVITY, AGE OF MATURITY

Dr. Charles E. Johnson of New York, after a study of the muskrat in that state adds, after admitting the difficulty in answering the question, that it is probably within reason to say that a muskrat may live as long as ten years or more. Some set sexual maturity at four months but this too remains to be proved. Even though they may breed this early it seems evident that muskrat do not physically mature or reach real prime condition as regards pelage until about a year old.

DETERMINATION OF SEX

The sex of muskrats, especially of those under a year old, is somewhat difficult to determine. One reason is that the testicles of the male are under the skin and so cannot be seen. Identification, however, becomes easier with experience. Sex in adult muskrats is more patent in the spring than in the fall season. Both male and female possess a small teat-like projection which lies a little below the anus or about two inches from the tail on the under side of the body. The space between this projection and the anus on the female is bare while that on the male is furred. By pressure exerted on each side of the base of this projection or by pushing back the skin a part of the male muskrat's genital organ will be disclosed. Close examination of the base of this projection on the female will disclose a small opening. Until the female has been bred, however, this opening is usually covered with a thin skin which is easily broken. Within this opening are located the sexual organs of the female. It is also stated that the lower end of the breast-bone of the female is more prominent than that of the male and that by feeling the lower part of the belly this can be ascertained. The following is another presentation of the

signs by which sex in muskrats may be determined: two organs, the anus and the protuberance which contains the outlet for the urinary system will be disclosed in the male. On the female will be disclosed three organs, the anus, the vagina or opening wherein is seated the sexual organs and the protuberance which contains the outlet of the urinary system.

HANDLING

When a muskrat is handled by the tail or otherwise, care should be exercised not to injure or strain the spine of the animal, which is very sensitive. In handling a muskrat lay one hand on its back, over the forelegs, holding it so as to prevent its turning on you. With the other hand take a firm grip on the tail and lift the animal gently. Should it attempt to twist upwards in an effort to bite the hand, execute a swift, short dropping movement, still holding the tail; this will cause it to drop its head.

SEX FUNNEL OR BOX

Examination for sex is usually made by taking the animal by the tail in the manner above described and lowering it head downwards into what is known as a "sex funnel" or "sex box." These vary in make, but generally they are about a foot long and taper to about four inches in diameter at the small end. Some are constructed of thin galvanized sheet metal, while others are made of small meshed wire netting on a framework of wooden strips. As an aid to the examination, when the animal has been put in the sex box, some breeders fasten the hind legs of the animal to the upper end of the box by means of small adjustable grips or clamps. The adjustments, however, should be so formed and fastened as not to injure the hind legs of the animal. Banding of the male for identification is usual after the sex of the animal has been determined.

FENCING

The number of animals raised to maturity is the determining factor in successful muskrat farming and herein lies the reason why the fencing of muskrat-populated areas is advocated. By this means protection is given against a great many of their natural enemies. Opportunity is also afforded for closer observation of the breeding and other habits of the animals, and facilities are generally better for a more scientific study and the application of scientific methods in propagating them. Trapping can also be regulated so as to obtain a sufficient number for breeding stock at all times. The type of fencing which has been found most suitable is constructed of one-inch mesh galvanized wire netting of fifteen or fifteen and a half gauge. Where the ground is uneven the chain link type of netting is favoured by many. The height of the fence averages about three feet above ground. It is topped by a strip of galvanized sheet iron about fifteen inches wide. Where the ground is fairly firm the fence is usually sunk about a foot below the surface; if it is placed some distance from the marsh, less depth may be required. Circumstances should be the guide in this particular matter. In soft mucky ground it should be sunk two feet below the surface of the ground. Both steel and wooden posts are used. Steel posts are advocated for use on firm ground and cedar posts for soft mucky ground. Water and especially ice conditions are a cause of considerable trouble on various marshes. The lowering of the water-level and the movement of ice may tear the wire from the posts. Sufficient and strongly built sluice-ways to handle spring floods which endanger the muskrats in their houses, more especially the young, should be provided at inlets and outlets of streams entering marshes, and care should be taken to prevent their clogging by debris. The costs of fencing vary somewhat, according to height and the quality of the wire, size of mesh, transportation costs, etc. To fence a mile of marshland with a suitable wire

fence of say, 1-inch mesh, 15-gauge wire, 4-foot netting (3 feet above and 1 foot under ground), with a topping of 1½-foot sheet metal, is stated to be about $1,500 a mile. Suitable wire and other material for enclosing marshes can be obtained from hardware and other dealers.

FEEDING

The muskrat is largely a vegetarian. The foods eaten include those bulbous and other aquatic growths of its natural habitat such as cat-tails (which is said to be most favoured), wild rice, arrow-head, yellow pond lily, sweet flag, blue flag, and leaves of willow, white ash, buttonbush and sweet gale. They also relish grain, apples, corn, carrots, parsnips, turnips, beets, dandelion, clover, hay, alfalfa. Mussels, carp and other sluggish fish are sometimes eaten by them. When ponds are frozen they are restricted to the available supply under the ice or such supplementary supplies as may be stored by marsh owners in pits connected with the marsh and to which they have access. In summer they have a more extensive choice. Contradictory statements have been noted relative to lettuce and cabbage as a food, some asserting they are dangerous and even fatal to muskrat.

Where land is available, crops of some of the vegetables and other foods eaten are grown as a supplementary food supply and fed to the muskrats in feeding pens placed close to the edge of the marsh. The muskrats, attracted by the fresh supply of food are soon enticed to enter these enclosures which are so arranged that breeding stock may be selected when desired. The pens are of wire with doors so arranged that they may be closed at will. Food is also placed on rafts. Pits are dug by some owners and so arranged that the muskrats may have access to them from the marsh; tiles are used for this purpose. This method is especially useful for winter feeding. A bushel of carrots has been stated to be sufficient to supply one muskrat a month.

PLANTING OF MARSH FOODS

Where the necessary soil and water conditions are found favourable to the planting of marsh plants attractive to muskrats as food, the planting of seeds or bulbs obtained from other marshes or secured from commercial dealers is no doubt practical. There are a number of firms in Canada that deal in seeds and bulbs of marsh plants eaten by muskrats and they would no doubt be able to advise as to the best methods of planting them.

Cat-tail is one of the chief foods eaten by muskrats. The seed, after being stripped from the cat-tail heads, is usually sown from a boat when a fairly stiff wind is blowing in a direction favourable to carrying it over the marsh. In this manner it is cheaply and efficaciously sown. In large marshes the canals which are made for the purpose of facilitating trapping and patrolling are helpful also for seeding purposes.

PEN RAISING OF MUSKRAT

Muskrat farmers in general in Canada and the United States are ranching this fur-bearer under natural conditions in marshland areas. Those who are fencing their marshes and guarding by other means this valuable animal, are materially increasing the production. Many progressive ranchers are also experimenting with the pen-raising or dry farming method and in this connection some results of importance to the industry have been achieved relative to the propagation of muskrats under conditions apart from their natural habitat. These results have demonstrated possibilities that hitherto were thought improbable. Some ranches have both marshes and the pen ranch system.

SOME ADVANTAGES CLAIMED FOR THE METHOD

It enables the muskrat to be protected from its natural enemies, such as minks, weasels, hawks, snapping-turtles, etc. Under pen-breeding conditions, where proper care and

handling have been given, it is claimed that the quality of the pelt has improved and the selected breeding stock bring higher prices, and that they are heartier and bear the hardships of shipment, exhibitions, etc., better than the marsh-bred animals. Handling of them is made easier and injury to the pelt reduced to a minimum.

This system permits of selective breeding and enables the evolving of a higher and better type of muskrat which are useful as breeding stock, especially for restocking marsh-land areas. They can be protected from climatic changes and the dangers caused therefrom, which may affect muskrats in the natural state, such as the freezing of marshes to the bottom during cold winters or the drying up during seasons of extreme heat.

PENS AND DENS

The ideas of muskrat farmers in regard to pens and dens vary considerably in certain details. Some breeders go so far as to say that muskrats will breed in any pen that has a den offering suitable nesting compartments that permit the female to conceal her young. No doubt, as in other lines, progress will be marked by the introduction of new ideas in pen construction and methods of handling. One type used is constructed as follows:—

Dimensions—length 8 feet, width 4 feet, height 2 feet. The frame is made of 2 by 2-inch wood and is covered with galvanized iron to prevent gnawing by the animal. The pen is covered top, sides and bottom with a 1-inch mesh, 14 to 16 gauge, galvanized wire netting. During warm, sunny weather a covering is provided to protect the animals from the sun. To prevent the animals injuring their noses by rubbing them against the wire, sheet metal to a height of about 18 inches is placed inside the wire and fastened securely. The floor is covered with sand to protect the feet of the animals. The door is constructed so that the animals may be handled to the best advantage. The den is located outside the pen but attached to it by a short chute about 4 inches across inside.

The den and chute are lined with thin sheet metal. The den is covered with sods to keep out noise and to give security and warmth. Clean straw should be provided for nesting purposes. This pen and den is described as being for a male and female and the young.

It is advisable to disturb the animals only when necessary, and when opening dens do so carefully, letting the light in gradually. The pens should be cleaned when necessary and should have a thorough cleaning about once a month and be disinfected about once a week. The cleaning program in regard to nest compartments, especially after the female has been bred, must not be overdone. Some females insist on being left alone, others are more amiable, which fact reveals why the individual traits must be observed and intelligently dealt with. Muskrats raised in pens should be protected from cold winds and extreme weather changes.

Another form of pen used by a large fur farming company is of the same dimensions as the one already described but the sides and floor are constructed entirely of galvanized sheet iron, No. 20 gauge being used. A wooden top is used during inclement weather and also as a protection from the heat of the sun in summer, a small opening being left at one end for air. No dens are used but instead, heaps of wet marsh grass are thrown at one end of the pen which is raised slightly to permit drainage. In this grass heap the females in the pen construct their nests, much as they would do in the wild state.

WATER SUPPLY

There is a difference of opinion with regard to providing swimming water for muskrats. In this connection one breeder advises: "When I raised them with only water for drinking purposes, their eyes got sore and they also became lousy, so it is very important for them to have water to swim in as well as to drink." Another breeder states that almost all who have failed in raising muskrats in pens have used a small water dish, and as muskrats in the natural state copulate in the water they balk at attempting to breed

when placed in pens, unless a sufficiently large water receptacle is provided to allow the male and female to enter the water at the same time. On the other hand the fur-farming company above mentioned uses no swimming water but have adapted the ordinary fountain water pan used by poultry breeders for the muskrats' drinking-water supply. The fountain is filled by turning it upside down and when inverted only enough water to fill a small trough is allowed to fall from the supply. The fountain is placed just high enough for the muskrats to reach and drink from the trough but adjusted so that they cannot get into it and dirty the water. This company has found "dry farming" perfectly feasible and has thus overcome one great obstacle in pen-raising muskrats. Where swimming water is used a tank sufficiently large to permit the muskrat to submerge should be provided. The water should be changed twice daily. The vessels holding the water will usually contain in the morning many droppings of the animal and must be cleaned out as soon as possible.

BREEDING

In pens monogamous and polygamous breeding of muskrat are both practised. One breeder who practises the pair to the pen method says that if they do not get on well together and start fighting one should be taken out or they will likely kill each other. He also states that about the time when the female is due to have offspring she will not be seen for several days. During this period the male will bring her food. Each pen should have a separate den for the female as two females will not live together. The breeding males also must be kept apart or they will fight. Except during the breeding season it is best to keep the males away from the females.

One method of polygamous breeding is to put several females, as many as ten, in one pen. A male, banded for identification, is put in and left there for twenty-four hours, when he is removed to another pen where a similar number

awaits him. In the pen vacated by him another male is introduced. This process is carried on until four males have had access to the females for one day each. This is done to insure that all females will be served and bred. Males selected for hardiness and colour are used for this purpose. Later, when all females are served, the males are returned to a pen reserved for them where they are especially well cared for.

GESTATION

The period of gestation of these pen-bred muskrats is said to be 19 to 21 days, and the young from the first spring litter reproduce before winter but the female will not have so many young as a more mature female muskrat. When the young are about three weeks old the mother muskrats are again mated by the process described. Four litters of young are born in this way during one year, and the production averages about thirty-five per female.

FEEDING IN PEN BREEDING

Clean utensils for eating and drinking are essential. These should be of a kind not easily rusted. Earthenware, graniteware or galvanized iron cups and pans are generally used. The utensils should be fastened so as not to upset when in use and that they may be readily removed for cleaning when desired. Food is usually placed before them twice daily. Their natural habit is to come out for their food at dusk. Give the food they are accustomed to in the wild state. They also relish cereals, grasses, vegetables and fruits, such as rolled oats, barley, cracked corn, clover hay, alfalfa, carrots, turnips, apples. The quantity of food sufficient for a daily ration for adult muskrats and the young is not yet definitely determined. Breeders have their own individual preferences. The availability or lack of the natural foods favoured by muskrat is a factor which affects the daily menu. About three ounces of natural foods per day per adult muskrat is one ration given with a small quantity

of cereals, carrots, etc. A good size handful of hay for two muskrats a day with a little vegetable food such as corn on the cob, carrots, parsnips, etc., makes a satisfactory diet. It is stated also that a bushel of carrots will feed a muskrat a month. Overfeeding is more harmful than underfeeding. It is stated that young muskrat should not be fed green food until about six weeks old and then sparingly, and that on introducing the male in the breeding season the best conditions can be established by feeding oats and corn. After being bred, green food should not be given for a few days and then only in small portions. It is found that fat muskrats will not breed any more than fat foxes or other animals and that overfeeding must be guarded against.

TRAPPING

In many cases trapping is crude and often very wasteful. Large numbers of muskrat which succeed in extricating themselves from traps are maimed, while valueless young and too great a number of females are killed. Long and vigorous trapping in one season may result in extermination. Over-trapping should not be practised as the future supply is endangered. In order not to overtrap some trappers guide themselves by the relative number taken. A decided falling off in the daily catch during the season would indicate that it was time to quit in that particular locality.

Muskrats are not difficult to trap but it is not an easy matter to hold them, and, as in any other business, the greater the experience of the trapper the better the results are likely to be. Special traps have been invented with the object of facilitating the trappers' efforts. There are several well-known traps and any dealer or sporting goods firm should be able to assist in the selection. The superiority of these special traps is due to their high or double jaws, which reduce to a minimum the muskrat's chance of escaping. They should be provided with extension chains. Catching them alive has many advantages and on small marsh areas the whole catch might very well be taken by the live-trap

method. The corral method and the taking of them by box traps on rafts or by luring them into feeding pens on land are methods especially useful for providing a proper selection of breeding stock. Spring is the best muskrat trapping season for then they are fully prime, and as the ice leaves they become very active and are easier to catch. The trapper ought to be a student of his craft and combine judgment with close observation.

SCENTS

Some trappers use scents to attract. There is considerable difference of opinion as to the value of their use but there is reason to believe that properly prepared scents, when properly used, are helpful. The musk of the animal is one of the best lures. It is secreted in small sacs under the skin on the animal's belly in front of the hind legs. It can be squeezed out of the sacs into a bottle. Another way is to grind up the entire glands and place them in alcohol. A few drops properly utilized at each set where possible will prove very effective in making catches. With reference to the musk of the animal as a lure, one authority states the following: "Secure the scent glands from six to a dozen muskrats in the spring. Squeeze the musk into a bottle and add some alcohol to keep it from spoiling. To the quantity of musk add about six ounces oil of anise and you have one of the best lures for muskrats that can be found." These scents may also be procured from drug firms and others manufacturing this class of goods. The scent should not be placed on the trap but near it. Apples, carrots, turnips, mangolds, etc., make good bait.

A good place to trap muskrats is at the feeding grounds which may be located by grass or other vegetable life floating on the surface of shallow water in the ponds where they abound. They have also trails through marshes which they particularly follow and traps properly set on these pathways bring results. They are also trapped at the foot of slides where they have a habit of playing. When the trap is set in two inches of water the muskrat will usually be

caught by the foreleg, when set in deeper water the catch will generally be by the hindleg. Trapping on a still-water marsh is less difficult than on an ebb and flow marsh where the rise and fall of the water must be considered. The pelts of spring-caught muskrats command the best price. In Canada they should never be caught during the fall months or late spring except in the more northern sections. The open trapping seasons in the various provinces will be a guide in this connection.

LIVE-ANIMAL TRAPS

A practical trap for taking muskrat alive and uninjured is one designed so that it is capable of floating. Some in practical use have a platform of wood on which is set a galvanized meshed wire framework of such form as a shallow wire basket upside down. The bait pan and spring are designed and adjusted to take the muskrats by causing the wire framework to fall and enclose them when they pull at the bait. A folding box trap made of zinc-coated wire and so constructed that it can be collapsed and folded flat is another form of trap which is used. These are made of light wire material and it is claimed that, owing to their lightness and to the fact that they can be collapsed, a large number of them can be carried by a trapper without much difficulty. These traps are used for catching muskrats in marshlands. They may be partly disguised by being covered with grasses. Baits advocated are the natural root parts of bulrushes and other marsh growths to which muskrats are accustomed. When muskrats have acquired a taste for apples, carrots, and other vegetables these may also be used.

Box traps made of wood are also used. The gates, made of wood or wire, slant inwards permitting the animal to shove its way into the box. When the animal has passed the gate it automatically falls back in place and, owing to the angle at which it lies, prevents the trapped animal passing out again.

Another method for taking muskrat alive is to sink an open barrel in the ground close to the bank of the stream, pond or marsh where muskrats are known to be. The top of the barrel should be on a line with the ground level and the barrel should be about half full of water. Carrots or other vegetables favoured by muskrat should be placed on the surface of the water. A piece of board eight inches square and some small chips are also floated, the purpose being to delude the animal into jumping into the barrel in order to obtain the food. Steel traps are sometimes used but the jaws must be well padded to prevent injury.

THE CORRAL METHOD

This method is used to catch muskrat at the water's edge. The corral is usually about 10 feet in diameter and made of 1-inch mesh of not less than 14 or 16-gauge wire. It should be about three feet in height above the water line and have a door on the pond side. Strong stakes should support the wire which should be buried about a foot below the ground surface. There should be a 12-inch overhang on the inside at the top. A swing door or a trap door hung so that it can be easily sprung when the muskrat enters is placed in the corral trap. Feeding pens placed on land to which the muskrats have been induced to come in order to obtain delicacies favoured by them is another form of the corral trap.

Live animal traps can be made by persons mechanically inclined or can be procured through supply houses specializing in trappers' supplies. The United States Department of Agriculture, Washington, D.C., in miscellaneous circular No. 69, which can be had on application, gives a detailed description of a beaver trap designed by Vernon Bailey of the United States Bureau of Biological Survey, for capturing beavers alive for control and propagation and which may be manufactured by anyone for personal use. It is stated that this trap has been thoroughly tested and found

satisfactory. This form of trap made on a smaller scale would, no doubt, be suitable for muskrat and smaller fur-bearers.

PREPARATION OF PELTS

Muskrats taken for fur should be trapped, not shot or speared. When trapped, if alive, they should be killed by a sharp blow on the head.

The pelt when intended for the market should be "cased," not opened along the belly. Begin at the heel and slit up the middle of the hind leg to the tail, around it, and then down the other leg to the heel in the same way. No other cuts are required. Then turn the skin back over the body, leaving the fur side inward. The skin peels off easily to the front feet. Cut closely around the nose, ears and lips so as not to tear the pelt. The skin inside-out is stretched over a thin board or a shingle about 20 inches long and 6 inches wide with one end tapered to a rounded point. The tapering begins about six inches from the end. A tack or two is inserted to keep the skin in position. Galvanized wire stretchers are also much used. The skin should be dried in the open air, not before a fire or in the sun, and it must be kept out of the rain. When properly dried the pelt will last for a considerable period without injury.

The monograph "The Preparation of Pelts for the Market," which may be obtained free from the Natural Resources Intelligence Service, Department of the Interior, Ottawa, contains information regarding skinning, stretching, drying and shipment of raw pelts, including muskrat.

SHIPPING LIVE MUSKRATS

In addition to the sale of muskrat pelts there has developed considerable activity in the sale of live muskrat for breeding purposes. The shipment of breeding stock requires that the animals be sometimes shipped long distances and that provision be made for their comfort and safety en route in order that they may be received in good order by the purchaser. To insure a greater measure of

safety and comfort during transportation crates for shipping have been devised. The crates are made of a combination of wood, sheet metal and wire netting. Each muskrat is provided with a separate compartment about 8 by 10 by 10 inches. Crates are made to contain 6, 8 and 10 muskrats. In many cases the breeders supply the shipping crates. Arrangements are made with the carrying companies for the care of the animals, food and water being supplied. In this way Canadian muskrats have been shipped successfully over long distances both by land and water, including ocean travel. Several consignments have already been sent to foreign countries for breeding purposes, adding to the value of the already considerable exports of live Canadian fur-bearing animals.

GOVERNMENT REGULATIONS

The various Provincial Governments have established departments to administer regulations with respect to the fur and game resources in their respective domains. A permit must be obtained from the Game Branch of the province in which the fur farm is located and those desirous of obtaining copies of the Game Laws or specific information in regard to fur farming regulations, permits, etc., may secure information from the Game Branches of the various provinces, situated at Charlottetown, P.E.I., Fredericton, N.B., Halifax, N.S., Quebec, P.Q., Toronto, Ont., Winnipeg, Man., Regina, Sask., Edmonton, Alta., and Vancouver, B.C. Similar information respecting Dominion regulations relative to the North West Territories may be obtained from the Director of North West Territories and Yukon Branch, Ottawa, and for the Yukon from the Gold Commissioner, Dawson, Yukon Territory.

EXPERIMENTAL FUR FARMS

Experimental fur farms have been established in some of the provinces of Canada for the purpose of studying various aspects of the breeding and care of fur-bearing animals with the object of providing complete information as far as possible regarding the raising of fur-bearing animals.

MUSKRAT FARMS

According to the Dominion Bureau of Statistics, Ottawa, the number of muskrat farms in operation in Canada in 1927 was 172 as compared with 107 in 1926. There were also a number of fox farms and miscellaneous fur-bearing animal farms on which muskrats were raised. Statistics for the years 1926 and 1927 are given hereunder:—

	1926	1927
Estimated number of muskrats on farms..	35,838	55,390
Estimated value of muskrats on farms....	$73,308	$127,921
Number of live muskrats sold off farms...	751	951
Value of live muskrats sold off farms.....	$3,373	$6,719
Number of muskrat pelts sold off farms...	554	5,240
Value of muskrat pelts sold off farms.....	$896	$8,564

LIST OF BREEDERS

A list of those engaged in muskrat breeding in Canada is included in " Report on the Fur Farms of Canada," issued annually, and obtainable on application to the Dominion Bureau of Statistics, Ottawa.

BREEDERS' ASSOCIATIONS

Associations have been formed in Canada with the purpose of advancing the interests of those who are engaged in the raising of muskrats and to form the basis of co-operation between breeders.

PELT PRODUCTION AND PRICES

The number and average value of muskrats taken in Canada in the seasons 1921-22 to 1926-27, according to the Dominion Bureau of Statistics, Ottawa, are given hereunder. It will be noted that a marked decrease in the catch was recorded in the last year for which complete official figures are obtainable.

Season	Number of Pelts	Average Value
1921-22	3,060,526	$1 54
1922-23	3,846,161	1 32
1923-24	2,985,395	1 15
1924-25	2,515,142	1 11
1925-26	1,953,545	1 54
1926-27	1,774,954	1 88

Number and Average Value of Muskrat Pelts Taken Season 1926-27 by Provinces

Province	Number of Pelts	Average Value
Prince Edward Island	1,007	$1 69
Nova Scotia	17,461	1 50
New Brunswick	13,835	2 11
Quebec	128,713	1 85
Ontario	469,947	2 16
Manitoba	226,841	2 13
Saskatchewan	389,436	1 50
Alberta	306,499	1 90
British Columbia	83,954	1 69
North West Territories	124,879	1 74
Yukon Territory	12,382	1 74
Total	1,774,954	$1 88

The prices paid for high-grade and medium raw muskrat pelts at Canadian fur auction sales during the past six years ranged from $1 to $3.25. The number of muskrat pelts offered at these sales during the year 1928 was well over half a million. The general classes of pelts sold and the range of prices paid at these sales during 1928 and the early part of 1929 are shown hereunder:—

	Range of Prices
Year 1928—	
Spring muskrat	$1 40 to $2 70
Winter and fall	1 10 to 2 05
Shot and damaged	44 to 1 55
Year 1929 (early part)—	
Spring muskrat	1 32 to 2 25
Winter and fall	94 to 2 00
Shot and damaged	42 to 1 10

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The suggestions in the foregoing have been prepared by the Natural Resources Intelligence Service, Department of the Interior, Ottawa, Canada, from various sources and are believed to be in accordance with the best practice. Any further suggestions, additions or corrections, from persons with experience in muskrat farming will be gladly welcomed by the Service.

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